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| 10/758,376      | 01/15/2004  | Xinliang David Li    | 200313024-1         | 5436             |

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HEWLETT PACKARD COMPANY  
P O BOX 272400, 3404 E. HARMONY ROAD  
INTELLECTUAL PROPERTY ADMINISTRATION  
FORT COLLINS, CO 80527-2400

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| EXAMINER |
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KANG, INSUN

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| ART UNIT | PAPER NUMBER |
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2193

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08/08/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

JERRY.SHORMA@HP.COM  
mkraft@hp.com  
ipa.mail@hp.com

|                              |                                      |                                  |  |
|------------------------------|--------------------------------------|----------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/758,376 | <b>Applicant(s)</b><br>LI ET AL. |  |
|                              | <b>Examiner</b><br>INSUN KANG        | <b>Art Unit</b><br>2193          |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 May 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-18 and 20-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-18, and 20-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. This action is in response to the Appeal Brief filed 5/19/2008.
2. In view of the appeal brief filed on 5/19/2008, prosecution is hereby reopened. New grounds of rejection are introduced below. To avoid abandonment of the application, appellant must exercise one of the following two options:
  - (1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or, (2) request reinstatement of the appeal. If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted.

The previous office action has been withdrawn. Claims 1, 2, 4-18, and 20-35 are pending in the application.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
4. Claims 1, 2, 4-14, 16-18, 20, 21, 24-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiranandani et al. (US Patent 5,812,855) hereafter Hiranandani, in view of Ho et al. (US 5,923,882) hereafter Ho.

Per claim1:

Hiranandani discloses:

- accessing a first file including source code therein; accessing a second file including object code therein and further including object file summary information (i.e. col. 6 lines 55-56)
- and further including object file summary information; and generating the executable binary file from at least the first and second files (i.e. col. 8 lines 38-46)
- wherein the object file summary information includes a summary intermediate representation (SIR) (i.e. col. 9 lines 46-59)

Hiranandani teaches restructuring the traditional link command to invoke an interprocedural optimization phase (i.e. col. 3 lines 65-67) but does not explicitly teach that the object file summary information includes an extension to a linker symbol table. However, Ho teaches such an extension to a linker symbol table was known in the pertinent art, at the time applicant's invention was made, to correctly relocate addresses of all symbols that are referenced (i.e. col. 4 lines 60-67). It would have been obvious for one having ordinary skill in the art to modify Hiranandani's disclosed system to incorporate the teachings of Ho. The modification would be obvious because one having ordinary skill in the art would be motivated to relocate a shared library to any virtual address by updating the global symbol table with correct values (col. 4 lines 60-67).

Hirandandani further discloses: wherein the object file summary information is used in optimizing the executable binary file generated (i.e. col. 9 lines 25-33, 54-60).

Per claim 2:

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Hiranandani further discloses:

- disambiguating memory accesses otherwise considered aliased using the object file summary information (i.e. col. 9 lines 54-59).

Per claim 4:

Ho further discloses:

- wherein the extension to the linker symbol table includes a flag indicating whether a procedure exposes a memory address by storing the address in a location accessible outside the procedure (i.e. col. 6 lines 44-56).

Per claim 5:

Hiranandani further discloses:

- wherein the SIR includes a summary symbol table (i.e. col. 9 lines 55-59).

Per claim 6:

Hiranandani further discloses:

- wherein the summary symbol table includes global and static symbols accessed in the procedure, formal parameters of the procedure, return location for the procedure, and other procedures called by the procedure (i.e. col. 9 lines 54-65; col. 11 lines 43-58).

Per claim 7:

Hiranandani further discloses:

- wherein a symbol is referenced in the summary symbol table in using an associated summary symbol identifier (SYMID) (i.e. col. 10 lines 65-67; col. 11 lines 41-50).

Per claim 8:

Ho further discloses:

- wherein a symbol entry includes a linker identifier (LI\_ID) of the entry from a linker symbol table (i.e. col. 10 lines 65-67; col. 11 lines 41-50).

Per claim 9:

Hiranandani does not explicitly teach that the SIR uses an operator for memory referencing. However, Ho teaches memory referencing was known in the pertinent art, at the time applicant's invention was made, to provide implicit memory access record (i.e. col. 7 lines 40-52). It would have been obvious for one having ordinary skill in the art to modify Hiranandani's disclosed system to incorporate the teachings of Ho. The modification would be obvious because one having ordinary skill in the art would be motivated to provide implicit memory access record of direct and indirect references (i.e. col. 7 lines 40-52).

Per claim 10:

Hiranandani further discloses:

- wherein the SIR uses an operator to adjust the address expression by an offset (i.e. col. 10 lines 65-67; col. 11 lines 41-50).

Per claim 11:

Hiranandani further discloses:

- wherein the SIR uses an operator to take an address of a function or variable (i.e. col. 11 lines 9-13).

Per claim 12:

Hiranandani further discloses:

- wherein the SIR uses an operator to merge pointer values from different control flow paths (i.e. col. 11 lines 41-47).

Per claim 13:

Hiranandani does not explicitly teach that the SIR uses an operator to represent direct procedure calls. However, Ho teaches memory referencing of direct procedure calls was known in the pertinent art, at the time applicant's invention was made, to provide implicit memory access record (i.e. col. 7 lines 40-52). It would have been obvious for one having ordinary skill in the art to modify Hiranandani's disclosed system to incorporate the teachings of Ho. The modification would be obvious because one having ordinary skill in the art would be motivated to provide implicit memory access record of direct references (i.e. col. 7 lines 40-52).

Per claim 14:

Hiranandani does not explicitly teach that the SIR uses an operator to represent indirect procedure calls. However, Ho teaches memory referencing of direct procedure calls was known in the pertinent art, at the time applicant's invention was made, to provide implicit memory access record (i.e. col. 7 lines 40-52). It would have been obvious for one having ordinary skill in the art to modify Hiranandani's disclosed system to incorporate the teachings of Ho. The modification would be obvious because one having ordinary skill in the art would be motivated to provide implicit memory access record of indirect references (i.e. col. 7 lines 40-52).

Per claim 16:

Hiranandani further discloses:

- wherein the SIR includes a control data structure comprising a link field for each procedure that points to an SIR block of a next procedure (i.e. col. 4 lines 13-23).

Per claim 17:

Hiranandani further discloses:

- the SIR includes a control data structure comprising a table having links to an SIR block for each procedure (i.e. col. 1 lines 30-36).

Per claim 18:

Hiranandani further discloses:



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- determining variables modified by and referenced by function calls in the object code using the object file summary information (i.e. col. 11 lines 9-13).

Per claim 20:

Ho further discloses:

- wherein the extension to the linker symbol table includes a first flag indicative of whether a procedure modifies non-local variables and a second flag indicative of whether the procedure references non-local variables (i.e. col. 7 lines 40-52).

Per claim 21:

Ho further discloses:

- wherein the extension to the linker symbol table includes a second flag indicative of whether the procedure modifies global/static variables excluding callees and a third flag indicative of whether the procedure references non-local variables excluding callees (i.e. col. 7 lines 40-52).

Per claim 24:

Hiranandani further discloses: the second file comprises a load module that is a shared library of procedures (i.e. col. 9 lines 42-46; col. 10 lines 20-25).

Per claim 25:

Hiranandani further discloses:

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- wherein multiple files including object code are accessed and used in compiling the program (i.e. col. 10 lines 15-20).

Per claims 26-28, they are the system versions of claims 1-2 and 18 respectively, and are rejected for the same reasons set forth in connection with the rejection of claims 1-2 and 18 above.

Per claim 29:

Hiranandani further discloses:

- the translator comprises: a compiler configured to translate source files into intermediate files; and a linker configured to access the object file summary information and communicate information to the compiler relevant to optimizing compilation of the program (i.e. col. 9 lines 46-59).

Per claim 30:

Hiranandani further discloses:

- a feedback provider that provides a communications interface between the compiler and the linker (i.e. col. 4 lines 1-12).

Per claims 31-33, they are the object file versions of claims 1, 3, 5, and 6 respectively, and are rejected for the same reasons set forth in connection with the rejection of claims 1, 3, 5, and 6 above.

5. Claims 22, 23, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiranandani et al. (US Patent 5,812,855) hereafter Hiranandani, in view of Ho et al. (US 5,923,882) hereafter Ho, and further in view of Lohmann (US Patent 5, 826,087).

Per claim 22:

Hiranandani and Ho do not explicitly teach that the per-procedure summary data comprises a linked list of entries corresponding to symbols directly mod-refined in a procedure. However, Lohmann teaches using a linked list as data storage was known in the pertinent art, at the time applicant's invention was made, to provide efficient memory usage (i.e. col. 5 lines 15-25). It would have been obvious for one having ordinary skill in the art to modify Hiranandani and Ho's disclosed system to incorporate the teachings of Lohmann. The modification would be obvious because one having ordinary skill in the art would be motivated to dynamically adjust memory space as a linked list grows and shrinks.

Per claim 23:

Ho further discloses:

- wherein each entry comprises a linker identifier of a corresponding symbol and flags indicative of whether that symbol is modified or referenced (i.e. col. 7 lines 40-52).

Per claim 35:

It is the object file version of claim 22, respectively, and is rejected for the same reasons set forth in connection with the rejection of claim 22 above.

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6. Claims 15 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiranandani et al. (US Patent 5,812,855) hereafter Hiranandani, in view of Ho et al. (US 5,923,882) hereafter Ho, and further in view of Haber et al. (US Patent 6,966,055) hereafter Haber.

Per claim 15:

Hiranandani and Ho do not explicitly teach the SIR uses a no-operation type operator to discard values. However, Haber teaches such a nop instruction was known in the pertinent art, at the time applicant's invention was made, to replace with any removed or redundant code (i.e. col. 5 lines 5-10). It would have been obvious for one having ordinary skill in the art to modify Hiranandani and Ho's disclosed system to incorporate the teachings of Haber. The modification would be obvious because one having ordinary skill in the art would be motivated to replace any removed instructions for timing purposes.

Per claim 34:

It is the object file version of claim 9-15, respectively, and is rejected for the same reasons set forth in connection with the rejection of claims 9-15 above.

### ***Response to Arguments***

7. Applicant's arguments with respect to the claims 1, 2, 4-18, and 20-35 have been considered but are moot in view of the new ground(s) of rejection.

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8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to INSUN KANG whose telephone number is (571)272-3724. The examiner can normally be reached on M-R 7:30-6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lewis A. Bullock, Jr. can be reached on 571-272-3759. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Insun Kang/  
Examiner, Art Unit 2193

/Lewis A. Bullock, Jr./  
Supervisory Patent Examiner, Art Unit 2193